FWIS 197: SCIENCE OR PSEUDOSCIENCE:
HOW TO TELL GOOD SCIENCE FROM JUNK SCIENCE

RICE UNIVERSITY SPRING 2020
MEETING TIMES: MWF 4:00-4:50 pm Brockman 103
INSTRUCTOR: Michael Cone
OFFICE: Brockman 228
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OFFICE HOURS: Tues. 1:30-2:30 pm, Weds. 2:30-3:30, Thurs. 3:00-3:50 pm, or by appointment

BASIC COURSE DESCRIPTION:
Is anthropogenic climate change real? Do vaccines cause autism? Will large doses of vitamin C treat your cold? Are genetically modified crops safe? What is homeopathy? Questions like these illustrate the difficulty that so often arises when dealing with the plethora of complicated topics and issues that are pervasive in modern culture. We can't be experts in every field, so how do we go about determining what is real, and what is fake? How can we tell good science from pseudoscience?

This writing-intensive course aims to address this issue by focusing on the application of scientific skepticism and critical thinking to questions like those mentioned above, and many others. We will discuss the inherent fallibility of human perception and memory, as well as the cognitive biases and logical fallacies that we so often fall victim to.

Throughout the course we will apply these concepts to various examples of pseudoscience. The topics will range from the absurd (e.g., astrology, flat earth theory, ancient aliens), to more sophisticated and controversial examples that have significant societal impact (e.g., climate change denial, vaccine refusal, alternative medicine). We will also discuss the demarcation problem that comes up when one attempts to categorize ideas and practices as scientific, or pseudoscientific. Other topics include: denialism, conspiracy theories, scams, quantum woo, and skepticism and the media.

FWIS LEARNING OBJECTIVES:
Regardless of your field, communication will be a vital aspect of your education and of your career after graduation. This course will help you to develop the writing and speaking skills that are an important foundation of strong communication, and thus an important foundation of university study in general. During the semester, we will focus on the following goals:

- Enhance understanding of the central place of writing and communication in the learning process and in academic life.
- Learn strategies for analyzing, synthesizing, and responding to college-level readings.
- Improve ability to communicate correctly and effectively in writing and in speech, taking into account audience and purpose.
- Become comfortable with writing as a process and learn strategies—for instance, prewriting, outlining, and revision-- for working through that process.
- Learn appropriate use of the work of others and, where necessary, specific practices of citation.

- Learn to articulate oral arguments and to respond productively to arguments of others in formal presentations and in class discussion.

SUBJECT LEARNING OBJECTIVES:

- To discuss, develop and utilize the skills of scientific skepticism and critical thinking.
- Learn to recognize common limitations and fallibilities of human perception, cognitive biases, and logical fallacies.
- Gain an understanding of the demarcation problem that is inherent in distinguishing science and pseudoscience.
- Gain a familiarity with both classic and contemporary examples of pseudoscience.

REQUIRED COURSE MATERIALS:

- Novella, S., Novella, B., Santa Maria, C., Novella, J., Bernstein, E. *The Skeptics Guide to the Universe: How to Know What's Really Real in a World Increasingly Full of Fake* [2018]
  ISBN: 978-1538760536
  (also available in new paperback edition ISBN: 978-1538760529)
- Pigliucci, M. *Nonsense on Stilts: How to Tell Science from Bunk,* 2nd edition [2018]
  ISBN: 978-0226495996
- Additional required reading (e.g., articles, book chapters, and other resources) will be posted on the course Canvas page throughout the semester.

COURSE ASSIGNMENTS:

Grade Distribution:

ASSIGNMENTS	**%**
Participation/Reading Assignments/In-Class Activities	12%
Weekly Discussion Posts (1-2 paragraphs on Canvas)	10%
Short Essay ("Letter to the Editor," 1-2 pages)*	5%
2nd Essay (2-4 pages)*	12%
3rd Essay (4-5 pages)*	16%
Research Paper (7-8 pages)*	30%
Final Group Project (with group oral presentation & 2-3 page reflection paper*)	15%
* Indicates Primary Writing Assignment	
	Total: 100%

A+ 98–100%	B+ 89–87%	C+ 79–77%	D+ 69–67%	F 59% or below
A 94–97%	B 84–86%	C 74–76%	D 64–66%	
A- 90–93%	B- 80–83%	C- 70–73%	D- 60–63%	

Participation and Attendance:
In-class discussion will play a key role in this course. With this in mind, you are expected to attend class and actively participate. Should you need to miss a class meeting for legitimate reasons or due to illness, you should notify me by email.

Writing Assignments:
I will provide handouts with detailed assignment descriptions and requirements for each of the five primary writing assignments (indicated with an * in the assignment listing above). These primary writing assignments will be spread throughout the semester, and a tentative schedule of assignment deadlines will be posted on the course Canvas page during the first week of class. The handouts will also include comments on how the assignments will be graded. General comments on some of the assignments are given below.

- *Short Essay ("Letter to the Editor")*: This will be your first primary writing assignment, and will be due in class on Friday, January 24th. I will give you a detailed assignment description handout on Wednesday of the first week of class.
- *Discussion Posts*: Each week I will provide a question or prompt regarding the topics being discussed in class (or in the required reading). Every student must post a brief response (just a paragraph or two) on the course Canvas page.
- *Research Paper*: For the research paper (7-8 pages) you will submit a proposal, produce a first draft, and then a final paper. Each student is required to have a short out-of-class meeting with me between the first draft and final paper deadlines. More details will be provided on the assignment description handout.
- *Group Project*: The group project will include both an oral presentation (given as a group presentation), and reflection paper (each student will write their own individual essay). The presentations will be given during the final exam period assigned to this course by the registrar. More details will be provided on the assignment description handout.

Guidelines for Written Work:
For all the written assignments you are expected to hand in both a print and an electronic copy. The print copy should be stapled together, and submitted in class on the posted due date. The electronic copy should be a .docx (word) file, and must be emailed to me prior to class time on the posted due date.

Unless otherwise stated, the primary writing assignments should be double-spaced, written in 12-point font (preferably Times New Roman or Garamond), and have 1-inch margins. Please note that the page count ranges for the assignments are meant to give a rough idea of the expected length. I will give more specific word count requirements in the assignment description handouts. Also note that the page (or word) count ranges refer to the length of the essay text, not including titles, author info (your name), or citations. Any specific formatting requirements given in the assignment description handouts supersede those given above.

It is always important to give proper credit when making use of the work, research or any creative content produced by others. With this in mind, all of your written assignments must be properly cited. Unless otherwise stated, you should use the Chicago (Turabian) style for citations and bibliographic information. A brief summary of the Chicago citation style can be found here: https://www.chicagomanualofstyle.org/turabian/turabian-notes-and-bibliography-citation-quick-guide.html. More detailed manuals are also available online for purchase, but you are not required to have one for this course.

Rice's Center for Academic and Professional Communication (CAPC) is an excellent resource for additional guidance and consultation on your writing. They offer writing workshops, as well as one-

on-one consultations by appointment. I strongly encourage you to make use of this resource throughout the semester. More information can be found here: https://pwc.rice.edu/center-academic-and-professional-communication

Deadlines:
You are expected to submit all assignments by the posted deadlines. Late assignments will be subject to grade reductions (up to and including refusal of submission) at the discretion of the instructor.

Writing Consultations:
Each student is required to have two out-of-class consultations with me throughout the semester. The first meeting will fall between the 2nd and 3rd essays mentioned on the assignments list. We will discuss your second essay, your topic for the third essay, and go over any concerns about your writing and/or research methods. The second meeting will fall between the draft and final paper deadlines for the research paper (see the Written Assignments section above). Of course, you are always welcome to schedule additional meetings with me throughout the semester.

Revisions/Rewrite Policy:
You have the option to revise two of the writing assignments (the 3rd Essay and the Research Paper) for an opportunity to receive a higher grade. If you wish to revise one (or both) of these assignments then you must:

- Notify me via email within 24 hours of receiving your original grade on the assignment.
- Schedule a meeting with me to discuss your revision plans.
- Schedule a meeting with a CAPC consultant to get additional support on your revision. The CAPC appointments can fill up quickly at certain times of the year, so make sure to schedule your appointment as soon as you decide to do a revision. The CAPC will provide you with a consultation attendance sheet. This must be handed in to me at the same time as your revised Essay/Paper.
- Revisions for the 3rd Essay are due one week after the original assignment is returned. Revisions for the Research Paper are due two weeks after the original final draft is returned.

Please note that:

- I reserve the right to refuse the revision option if I feel you did not make a reasonable effort on the first version of the assignment.
- I will not accept revisions if you have not discussed your revision plans with me.
- Just completing a revision does not guarantee a higher grade. I do not recommend that you undertake a revision unless you have the time do it thoroughly.
- For the 3rd Essay, your grade on the revision will replace your grade on the original assignment. For the Research Paper, your grade on the revision will replace your grade on the original final draft of the assignment.

The Honor Code:
At Rice we believe very strongly in the Rice University Honor Code. It applies to all work submitted for a grade in the course, and, as instructors, we perform our due diligence in upholding it. You can review the honor code here: http://honor.rice.edu.

It is extremely important to avoid plagiarism, or the use of someone else's work without citation. In class we will go over what does (and does not) constitute plagiarism in detail. We will also spend time discussing proper citation of sources. That being said, if you are ever unsure regarding issues of plagiarism (or citation of sources), then you should feel free ask me for clarification.

Disability Accommodations:
Any student with a documented disability seeking academic adjustments or accommodations should meet with me during the first two weeks of class (if possible). All such discussions will remain as confidential as possible. Students with disabilities are also encouraged to contact Disability Support Services, located in the Allen Center (e-mail: adarice@rice.edu, phone: 713-348-5841), during the first two weeks of class so that timely and appropriate arrangements may be made.